Small Business Innovation Research/Small Business Tech Transfer

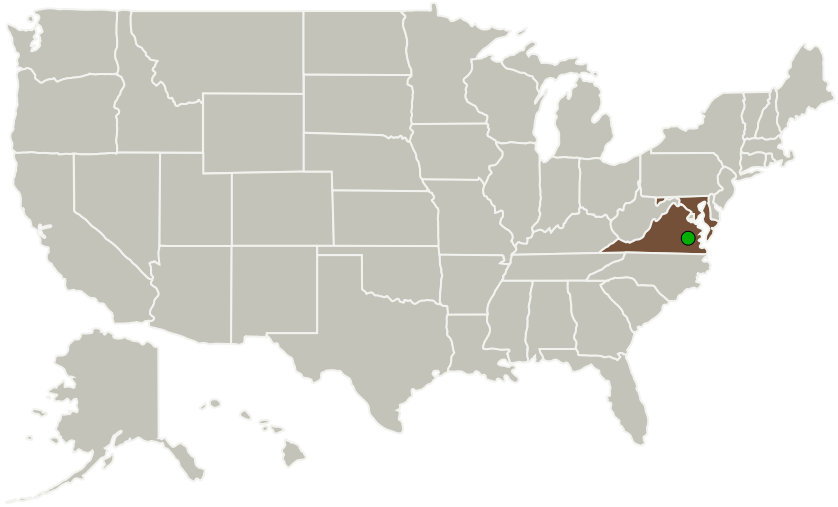
Variable Complexity Weight Estimation for Conceptual Aircraft Design Optimization (VaC-CADO), Phase I

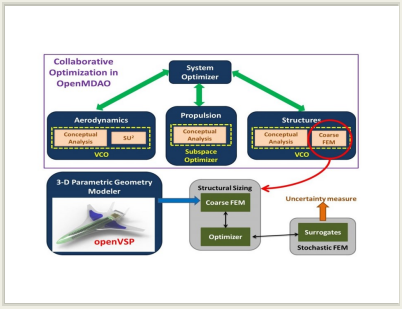
Completed Technology Project (2014 - 2014)

Project Introduction

The defense and the commercial sectors in US have been undergoing severe energy issues, with the prices and demand of fuel increasing over the years. Thus investigations into advanced fuel efficient designs have become inevitable. With increase in air traffic, environmental concerns of noise and emissions have also been brought to the forefront. This has resulted in NASA's ambitious N+3 vision, as exemplified in the Subsonic Fixed Wing projects's four corners of the design trade space. Also, the burgeoning interest in UAS platforms promises significant departures from traditional aircraft designs. To enable introduction of new aircraft into the inventory, the conceptual design of advanced concepts is critical. However, the aircraft design community realizes a need for introducing physics based analysis early in the design space. In particular weight estimates based on statistical relations are inadequate for new concepts, and there is a need for improved weight estimation. For this purpose, Intelligent Automation proposes VaC-CADO, a variable complexity conceptual aircraft design tool for the design of advanced airplanes by combining multi-fidelity optimization and MDO with FEM-based weight estimation. This is a novel technique leveraging on state-of-the-art in aircraft design and enhancing it using our extensive experience in this field.

Primary U.S. Work Locations and Key Partners





Variable Complexity Weight Estimation for Conceptual Aircraft Design Optimization (VaC-CADO) Project Image

Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

Variable Complexity Weight Estimation for Conceptual Aircraft Design Optimization (VaC-CADO), Phase I

Completed Technology Project (2014 - 2014)

Organizations Performing Work	Role	Type	Location
Intelligent Automation, Inc.	Lead Organization	Industry	Rockville, Maryland
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Maryland	Virginia

Project Transitions

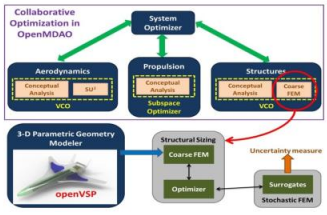
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137729)*

Images



Project Image
Variable Complexity Weight Estimation for Conceptual Aircraft Design Optimization (VaC-CADO) Project Image
(https://techport.nasa.gov/image/134409)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Intelligent Automation, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

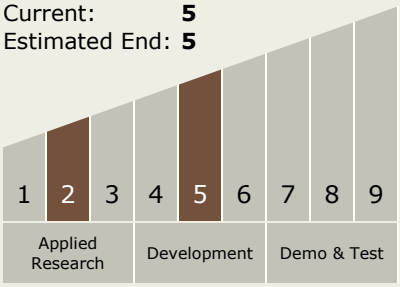
Carlos Torrez

Principal Investigator:

Nikhil Nigam

Technology Maturity (TRL)

Start: **2**
Current: **5**
Estimated End: **5**



Variable Complexity Weight Estimation for Conceptual Aircraft Design Optimization (VaC-CADO), Phase I

Completed Technology Project (2014 - 2014)

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.2 Modeling
    - TX11.2.4 Science Modeling

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System